

What is claimed:

- 1           1.       A method for detecting leakage from a disk drive enclosure, comprising:  
2           providing a disk drive enclosure having a lubricating material and a tag material  
3           therein, wherein at least a portion of the lubricating material and the tag material are in the  
4           vapor phase; and  
5           measuring a concentration of the tag material in the vapor phase.
- 1           2.       A method as in claim 1, wherein the tag material comprises a halogenated  
2           material.
- 1           3.       A method as in claim 2, wherein the halogenated material comprises a  
2           halogenated sulfur material.
- 1           4.       A method as in claim 1, wherein the tag material comprises at least one  
2           material selected from the group consisting of SF<sub>6</sub> and S<sub>2</sub>F<sub>10</sub>.
- 1           5.       A method as in claim 1, wherein the tag material comprises SF<sub>6</sub> and S<sub>2</sub>F<sub>10</sub>.
- 1           6.       A method as in claim 4, wherein the lubricating material comprises a  
2           perfluoropolyether.
- 1           7.       A method as in claim 1, further comprising determining a leak rate of the  
2           lubricating material from the vapor phase concentration of the tag material.
- 1           8.       A method as in claim 1, further comprising determining an amount of  
2           lubricating material remaining in the disk drive enclosure using the concentration of the tag  
3           material.

1           9.       A method as in claim 1, wherein the measuring a vapor phase concentration  
2 of the tag material is conducted inside of the disk drive enclosure.

1           10.      A method as in claim 9, wherein the measuring is carried out over a period of  
2 time at a predetermined interval.

1           11.      A method as in claim 1, further comprising:  
2           measuring a concentration of the tag material outside of the enclosure over a time  
3 interval and determining a leak rate of the lubricating material from the disk drive enclosure.

1           12.      A method as in claim 11, further comprising determining a quantity of the  
2 lubricating material remaining in the disk drive enclosure.

1           13.      A method as in claim 1, further comprising measuring a concentration of the  
2 tag material outside of the disk drive enclosure over a period of time and determining a leak  
3 rate of the lubricating material from the disk drive enclosure.

1           14.      A method as in claim 13, further comprising determining a quantity of the  
2 lubricating material remaining in the disk drive enclosure after the period of time.

1           15.      A method as in claim 1, wherein the tag material has a volatility that is  
2 greater than that of the lubricating material.  
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1           16.      A disk drive system comprising:  
2           at least one disk adapted to store data;  
3           at least one transducer adapted to read and write data to and from the disk; and  
4           a lubricant composition comprising a lubricant component adapted to lubricate the  
5 disk surface and a tag component, wherein the tag component has a volatility that enables  
6 the tag to be detected in the vapor phase.

1           17.     A disk drive system as in claim 16, wherein the tag component comprises a  
2     halogenated sulfur material.

1           18.     A disk drive system as in claim 16, wherein the tag component comprises at  
2     least one material selected from the group consisting of SF<sub>6</sub> and S<sub>2</sub>F<sub>10</sub>.

1           19.     A disk drive system as in claim 16, wherein the tag component comprises SF<sub>6</sub>  
2     and S<sub>2</sub>F<sub>10</sub>.

1           20.     A disk drive system as in claim 18, wherein the lubricating component  
2     comprises a perfluoropolyether.

1           21.     A disk drive system as in claim 16, wherein the tag component volatility is  
2     greater than that of the lubricant.

1           22.     A disk drive system comprising:  
2             at least one disk adapted to store data;  
3             at least one transducer adapted to read and write data to and from the disk;  
4             a first source of a volatile lubricant; and  
5             a second source of a tag component incorporated into a substantially non-volatile  
6     material, wherein the tag component has a volatility that enables the tag component to be  
7     detected in the vapor phase.

1           23.     A disk drive system as in claim 22, wherein the volatile lubricant includes a  
2     perfluoropolyether material and the tag component comprises a halogenated sulfur material  
3     that is incorporated into a hydrocarbon oil.

1           24.     A lubricant composition for disk drive systems comprising a  
2     perfluoropolyether material and a halogenated sulfur material.

1           25.     A lubricant composition for disk drive systems comprising a lubricant  
2     material and a tag material, wherein the tag material can be detected in the vapor phase.

1           26.     A lubricant composition as in claim 25, wherein the tag material comprises a  
2     halogenated sulfur molecule.

1           27.     A lubricant composition as in claim 25, wherein the tag material comprises at  
2     least one material selected from the group consisting of SF<sub>6</sub> and S<sub>2</sub>F<sub>10</sub>.

1           28.     A lubricant composition as in claim 27, wherein the lubricant material  
2     comprises a perfluoropolyether.

1           29.     A lubricant composition as in claim 27, wherein the lubricant material  
2     comprises a material selected from the group consisting of alcohols, hydrocarbon esters,  
3     stearic acid, palmitic acid, other carboxylic acids

1           30.     A lubricant composition as in claim 27, wherein the lubricant material  
2     comprises a material selected from the group consisting of a perfluoropolyether or a volatile  
3     hydrocarbon compounds of the variety used in formulating greases.

1           31.     A computer system comprising:  
2             a disk drive including a disk drive enclosure;  
3             a disk drive lubricant composition including a lubricant component and a tag  
4     component; and  
5             a sensor adapted to detect a quantity of the tag component in the vapor phase.

1           32.     A computer system as in claim 31, wherein the sensor is positioned outside  
2     the disk drive enclosure.

1           33.     A computer system as in claim 31, wherein the sensor is positioned inside the  
2     disk drive enclosure.

1           34.     A computer as in claim 31, where the computer includes a computer program  
2     that is capable of causing the computer system to measure the concentration of the tag  
3     component in the vapor phase at a predetermined time interval.

1           35.     A computer as in claim 31, wherein the computer includes a computer  
2     program that is capable of causing the computer system to measure the concentration of the  
3     tag component and determine at least one of a leak rate of the lubricant material from the  
4     disk drive assembly and an amount of the lubricant material in the disk drive assembly.

1           36.     A computer as in claim 31, wherein the tag component has a volatility that is  
2     greater than that of the lubricant.

1           37.     A computer as in claim 31, further comprising a lubricant component source  
2     and a target component source, wherein the lubricant component source is separate from the  
3     tag component source.

1           38.     A computer as in claim 31, further comprising a source that contains both the  
2     lubricant component and the tag component.

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